Amendments to the Claims

1. (canceled)

2. (previously submitted) The method of claim 14, wherein the step of irradiating a charged particle beam onto an area of the specimen surface at which the alignment mark is not present is performed by scanning the charged particle beam across a smooth planar region of the surface of the specimen.

3. (canceled)

4. (previously submitted) The method of claim 14, wherein:

the first backscattered-particle signal is obtained by scanning the charged particle beam across a smooth planar region of the surface of the specimen that represents the crystal-orientation plane, and

in the step of subtracting the first backscattered-particle signal from the second backscattered-particle signal to obtain a difference signal, the subtraction removes data, concerning the crystal-orientation plane, from the difference signal that otherwise would obfuscate data in the difference signal pertaining to the alignment mark.

5. (original) The method of claim 4, wherein:

the first backscattered-particle signal is further obtained by changing an angle of incidence of the charged particle beam as the beam is scanned across the smooth planar region of the surface; and

a waveform of the first backscattered-particle signal exhibits a change in amplitude with corresponding changes in the angle of incidence.

6. (previously presented) In a charged-particle-beam (CPB) microlithography apparatus including a CPB source that produces a charged particle beam, a CPB-optical system through which the charged particle beam passes from the CPB source to a substrate of which a surface has a crystal-lattice orientation and includes an alignment mark formed on the surface,

and a substrate stage on which the substrate is placed for exposure by the charged particle beam, a device for measuring an alignment of the substrate, the device comprising:

a deflector situated and configured to deflect the charged particle beam to cause the beam to irradiate a predetermined location on the surface of the substrate mounted on the substrate stage, so as to cause the location to produce backscattered particles;

a backscattered-particle detector situated and configured to detect backscattered charged particles produced by the location on the substrate as the location is irradiated by the charged particle beam;

a controller connected to the deflector and the backscattered-particle detector, the controller being configured to (i) energize the deflector in a manner causing the deflector to irradiate the beam on a first location on the surface lacking an alignment mark, thereby producing a background backscattered-particle signal including data generated by backscatter from features associated with the crystal-lattice orientation; (ii) energize the deflector in a manner causing the deflector to irradiate the beam on the alignment mark, thereby producing an alignment-mark backscattered-particle signal; (iii) calculate a difference signal by subtracting the background signal from the alignment-mark signal; and (iv) determine the position of the alignment mark from the difference signal.

7. (original) A CPB microlithography apparatus, comprising a device for measuring substrate alignment as recited in claim 6.

8. (previously submitted) A method for performing charged-particle-beam (CPB) microlithography of a specimen, comprising:

mounting the specimen on a substrate stage;

detecting a position of an alignment mark on the specimen using a method as recited in claim 14; and

microlithographically exposing a pattern onto the substrate.

9. (original) A microelectronic-device fabrication process, comprising the steps:

(a) preparing a wafer specimen;

(b) processing the wafer specimen;

(c) assembling devices formed on the wafer specimen during steps (a) and (b), wherein step (b) comprises a method for performing CPB microlithography as recited in claim 8.

10. (original) A microelectronic-device fabrication process, comprising the steps:

(a) preparing a wafer substrate;

(b) processing the wafer substrate;

(c) assembling devices formed on the wafer substrate during steps (a) and (b), wherein step (b) comprises the steps of (i) applying a resist to the wafer substrate; (ii) microlithographically exposing the resist; and (iii) developing the resist; and step (ii) comprises providing a CPB microlithography apparatus as recited in claim 7; and using the CPB microlithography apparatus to expose the resist with a pattern.

11. (canceled)

12. (canceled)

13. (previously submitted) The method of claim 14, wherein the first backscattered-particle signal includes data produced by scanning the charged particle beam across one or more Kikuchi lines on the surface.

14. (previously submitted) In a method for performing charged-particle-beam (CPB) microlithography of a specimen of which a surface has a crystal-lattice orientation, and an alignment mark is formed on the surface, a method for detecting a position of the alignment mark, comprising:

irradiating a charged particle beam onto an area of the specimen surface having the crystal-lattice orientation but at which the alignment mark is not present, and detecting

backscattered charged particles propagating from the irradiated area, so as to obtain a first backscattered-particle signal;

storing data in the first backscattered-particle signal in a memory;

irradiating the charged particle beam onto the alignment mark, and detecting backscattered charged particles propagating from the irradiated alignment mark, so as to obtain a second backscattered-particle signal;

recalling the stored data from the memory and subtracting the recalled data from the second backscattered-particle signal to obtain a difference signal; and

determining the alignment-mark position from the difference signal.

15. (canceled)